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Animal health management practices among dairy cattle farmers in the urban community of Niamey

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Abstract

Cattle herd management, combined with the use of veterinary products, represents a major challenge in animal production. A study was conducted in the urban community of Niamey with the aim of examining the health management of dairy cattle herds. A preliminary survey identified these livestock farms and the vendors of veterinary products with the help of the Rougas (Fulani representatives) from the various communes and the General Directorate of Veterinary Services (DGSV). Through convenience sampling, 25 vendors of veterinary products were interviewed. Hygiene practices are generally based on cleaning and disinfection for all the farmers, and health practices include regular monitoring (47%) and self-medication (45%). The vast majority of farmers (39%) purchase antiparasitic drugs and antibiotics, and more than two-thirds of these products are not approved. Antiparasitics are the most represented on the market with 30% of products and occupying second place in order of importance followed by antibiotics (27%) occupying the first class in order of importance. A rate of 96% of the surveyed farmers benefited from vaccination against peste des petits ruminants (PPR) and contagious bovine pleuropneumonia (CBPP). The dominant diseases are parasitic in origin (54%), followed by infectious diseases (32%). There is therefore a diverse range of practices in the health management of dairy cattle farms, highlighting the need to raise awareness about the risks of using unauthorized veterinary medicines.

Keywords: Health Management; Dairy Cattle; medicine; veterinarian; Niamey

1. Introduction

Livestock farming plays a vital role in production systems in sub-Saharan Africa in general [1]. In Niger, livestock farming is an income-generating activity that helps to strengthen the livelihoods of rural populations. It plays several roles: security, capital accumulation, diversification, and economic and social integration [2]. Animal production contributes nearly 11% to GDP and 24% to agricultural GDP. The constraints that hindered the development of peri-urban dairy production in Niger are linked on the one hand to animal species and on the other hand to inadequate health management practices implemented by farmers [3]. There is therefore a need to determine the possibilities for increasing productivity and improving the sector based on guidelines from good livestock farming practices [2]. The development of livestock farming may play a more indirect role in the emergence of pathogens at the interface between wildlife and human populations [4]. Animal diseases are responsible for increased mortality and decreased productivity in dairy herds worldwide, causing significant economic losses. Diseases that lead to reduced production, such as mastitis or internal and external parasites, do not usually result in the animal's death, but they still reduce the efficiency of the

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system. Diseases can affect milk productivity by decreasing milk production, reducing fertility, delaying puberty, reducing milk quality, and lowering feed conversion. Diseases of dairy species, such as tuberculosis and brucellosis, can also pose a risk to human health [5]. Dairy producers generally make little investment in animal health, particularly in disease prevention [5]. They can also be powerful tools for controlling infectious diseases in populations, particularly through the principle of herd immunity [6]. The interest in vaccinating our domestic animals has increased in recent decades in relation to a dual context: - "One Health" which promotes an integrated, systemic and unified approach to public, animal and environmental health at local, national and planetary levels [6]. Some authors have reported the establishment of veterinary medicine infrastructures, self-managed by women's self-promotion centers and village livestock assistants [7]. In Niger, there is a growing proliferation of unqualified actors in this sector who are fueling an illicit market for veterinary medicines. The medicines on the illicit market are those found at the stalls of vendors and informal retailers who have neither authorization nor technical qualifications to sell veterinary medicines [8]. Investigations in the livestock markets of commune 2 of Tahoua and Illéla, the markets of Badaguichiri, Guidan Idder (commune of Malbaza), Konni, Ayawane (commune of Tama), Bouza carried out by the National Network of Chambers of Agriculture made it possible to identify 135 veterinary products of which only 13% of the products are authorized [9]. These counterfeit and unauthorized products often contain lower concentrations of the active substance (in some cases, none at all), or they may contain other ingredients. This poses a serious threat to animal health and welfare; not only may these medications prove ineffective in treating the disease, but they may also be toxic to animals [9]. With regard to human health, the use of such products in animals intended for human consumption can reduce food safety. Their poor efficacy also increases the risk of zoonoses and the development of antimicrobial resistance (administration of concentrations below therapeutic levels [9]. It is necessary to examine the practices applied during the health management of dairy cattle herds in the Niamey community, hence the theme entitled "Health Management Practices Among Dairy Cattle Farmers in the Urban Community of Niamey." The overall objective of this study is to evaluate the health management practices of dairy cattle herds in the Niamey community.

2. Materials and Methods

2.1. Materials

2.1.1. Study Area

This study was conducted in three (3) municipal districts of Niamey (III, IV, and V) among cattle farmers and vendors of veterinary products (formal and informal).

2.1.2. Investigation equipments

The materials consisted of survey forms, an interview guide, and a GPS device for location tracking.

2.2. Method

2.2.1. Survey Method

Preliminary investigation

This made it possible to identify dairy cattle farms and sellers of authorized and unauthorized veterinary products in the urban community of Niamey. This identification was made through contact with the Rougas (Fulani representatives) of the different communes and with the General Directorate of Veterinary Services (DGSV) in order to better understand the dairy farms in the urban community of Niamey, and with the general directorate of veterinary pharmacies to better understand the characteristics of the products offered to farmers.

Selection of Surveys and Sampling

The farms selected for survey were chosen based on the presence of dairy cattle in the herd to be surveyed and the survey participants' agreement. The sampling method used was convenience sampling, which is non-probability sampling where participants are chosen based on their availability and accessibility. Twenty-five (25) interview guides for interviewing veterinary product vendors.

Data Collection

This concerns data on practices and the sale of veterinary products:

- Data on practices included, among other things, the pathologies encountered, methods of disease prevention, the different types of treatments applied, the sources of veterinary products and care, and the types of products purchased.
- Data on the sale of veterinary products included the typology of the products, the therapeutic class, and verification of the legitimacy of the products (legal or illegal).

➤ Product Identification Method

This method is based on the RECA method and applies to:

- Products from the West African Economic and Monetary Union (WAEMU) region: The list of all products with a marketing authorization (MA) within the WAEMU region must be considered. This list was obtained from the Ministry of Agriculture and Livestock;

- Products authorized in Niger: A veterinary medicinal product must have a marketing authorization. It cannot be placed on the market in Niger, dispensed to the public, or administered to animals unless it has a prior marketing authorization (MA).

- Products originating from Nigeria:



Products from Nigeria authorized for sale must bear a National Agency for Food and Drug Administration and Control (NAFDAC) number of the type NAFDAC REG. NO.: A10-0380 (example of a Multivitamin Bolus: AREPHARM (NAFDAC REG. NO.: A9-101034).

NAFDAC is the National Food and Drugs Regulatory Agency, established in 1993 in Nigeria to regulate and control the manufacture, import, export, distribution, sale, and use of chemicals, including veterinary and plant protection products [9].

-Verification of the NAFDAC registration number of products

It is possible to verify the authenticity of the registration number of veterinary products using a mobile phone or any device connected to the Internet by connecting to the official NAFDAC website: <https://www.nafdac.gov.ng/our-services/registered-products/> To do this, the search engine was used by typing NAFDAC and the registration number.

Data analysis method:

All data collected in the field were recorded in Excel Office version 2016. Word software was used for data entry, ArcGIS software was used for mapping, and Mendeley was used for reference management.

3. Results

3.1. Diseases Encountered

- Diseases Encountered in Dairy Cattle Farms

This refers to the presence of diseases at least once during the year for 41 farmers (82%), compared to 18% who reported no such occurrences. These types of diseases are listed in Table 1.

Table 1 Diseases Encountered in Dairy Farms

Type of disease	Number of Responses	Rate in %
Parasitic	44	54
Infectious	26	32
Functional	8	10
Deficiencies	3	4
Total	81	100

The dominant diseases are parasitism (54%), followed by infectious diseases (32%).

3.1.1. Disease Prevention Methods

-Vaccination Status

96% of the surveyed farmers received free vaccinations, while 4% received no vaccinations during the year. These vaccinations are intended to prevent diseases such as Peste des Petits Ruminants (PPR) and Contagious Bovine Pleuropneumonia (CBPP). Over 90% of respondents confirmed they were aware of the purpose of these vaccinations, and very few were unaware of their importance.

- Prevention by farmers:

Only 12% of farmers personally vaccinate against anthrax, symptomatic anthrax, and pasteurellosis, while 88% of the farmers surveyed do not take the initiative to vaccinate their animals.

- Hygiene measures:

All respondents practice hygiene in cleaning housing (100%), while 5% and 3% respectively practice hygiene during milking and cleaning of ropes.

3.1.2. Disease Treatment Methods

Disease Management Procedures

Disease management practices are detailed in Table 2.

Table 2 Animal Disease Management Methods

Management Method		Rate in %
	Consulting a veterinarian	50
Self-medication	Self-medication with modern substances	34
	Self-medication with traditional substances	16
Total		100%

Table 2 shows that 50% of farmers consult veterinarians in case of illness, followed by 34% who practice self-medication with veterinary products and 16% who use traditional substances.

Acquisition of products for self-medication with modern substances: Farmers who purchase veterinary products for self-medication represent 80% of respondents, compared to 20% who do not. This purchase is categorized according to therapeutic classes, as shown in Table 3.

Table 3 Medications purchased by farmers

Products	Rate in %
Antibiotic	10
Antiparasitic	62
Anti-inflammatory	17
Vitamin and Mineral Complexes (VMC)	11
Total	100

The purchase of antiparasitic drugs (62%) is the most common, followed by anti-inflammatories at 17%, then mineral and vitamin complexes at 10% and 11% respectively.

➤ Self-medication with traditional substances

Some livestock farmers use another method of health management with traditional substances or traditional remedies for certain diseases, as shown in Table 4.

Table 4 Diseases and typical traditional remedies used

Disease	Type of Traditional Remedy Used	Number of Respondents	Ethnicity
Foot-and-mouth disease	Dissolution used on mouth ulcers and the hooves of certain animals to heal wounds	2	Peulhs
Food poisoning	Charcoal and wood ash administered orally to animals	1	Peulhs
Constipation	Peanut oil	6	Peulh
	Natron	3	
	Orally administer baobab bark flour	1	Touareg
Origin unknown	Healing or branding with a red fire in the shape of an X or W on the neck or hind limbs	4	Peulhs
	Burning camel bones and spreading the manure in the stables	4	Zarma
Fascioliasis (liver fluke)	Bark of the fig tree (<i>Ficus platyphylla</i>) + <i>Laptandenia hastata</i> + dodder + penicillin	1	Peulhs
Total		22	-

A diversity of treatments using traditional substances was observed. Among those surveyed, ten (10) used three remedies to treat constipation, while eight (8) treated illnesses of unknown origin or those considered to be caused by witchcraft with two (2) types of remedies. Foot-and-mouth disease was treated by two (2) livestock farmers with a solution applied to mouth ulcers and the hooves or claws of certain animals to promote healing (Table 4).

3.1.3. Veterinary Products:

The objective of this directory is to identify the products offered to and purchased by livestock farmers, in order to better understand the risks posed by counterfeit or substandard veterinary products and to estimate their prevalence in the illicit market. It therefore aims to highlight the shortcomings in health management methods on dairy cattle farms.

- Directory of Veterinary Products 68 veterinary medicines were identified on the market, as illustrated in Figure 1.



Figure 1 Veterinary products sold (A, B)

Table 5 The therapeutic class and the number of products listed and authorized

Therapeutic class	Number of products recorded	Number of authorized products
Antibiotic	18	6
Antococcidial	6	1
Anti-inflammatory	8	2
Antiparasitic	20	4
CMV	10	2
Disinfectant	1	1
Vaccine	5	3
Total	68	19

Of the twenty antiparasitic products, four are unauthorized, and of the eighteen antibiotics, six are unauthorized (Table 5). Analysis of the identified products allowed for the identification of certain Nigerian products with their references (Figure 2). These include:

- an antiparasitic product (A), without a NAFDAC number, therefore not authorized for sale in Nigeria due to non-compliance with Nigerian regulations;
- a vitamin complex (B), with a NAFDAC number, but not found on the NAFDAC agency's list of authorized products;
- a powdered antibiotic (C), which does have a NAFDAC number and appears on the official list in Nigeria.



a



b



c

Figure 2 Products from Nigeria with their references

➤ Distribution of Antiparasitic Products

The 2014 list nomenclature in the PRAPS Pest, Hazardous Products and Waste Management Plan distinguishes between an anthelmintic class and an antiparasitic class. Products for controlling parasites are the most numerous (30%) on the market, as illustrated in Table 6.

Table 6 Distribution of Antiparasitic and Anthelmintic Drugs

Antiparasitic	Number	%
Albendazole	10	50
Ivermectin	6	30
Piperazine	1	5
Zoeben	3	15
Total	20	100

Albendazole accounts for 50% of antiparasitic products, Zoeben 15%, and Piperazine 5%. Some antiparasitics are also anthelmintics. Ivermectin represents 30% of antiparasitics on the Niamey market.

3.1.4. Antibiotic Distribution

Antibiotics represent one-third of the veterinary products identified on the market. Oxytetracycline, which accounts for 61% of commercially available antibiotic products, is followed by Tylosin (28%) and penicillins (benzylpenicillin or procaine benzylpenicillin) (11%).

➤ Mineral/Vitamin Complex

This is the third largest therapeutic class in terms of the number of commercial products, with a wide variety of products and packaging, and often non-compliant labels that make it impossible to know the product's composition.

- Product A states that "the original animal feed is a mixture of cassava, salt, and other supplements."
- Product B states "NAXMULT Multivitamin" but provides no composition information or identification number.
- Product C has no composition information or identification number; it only states "ALMA VEET" and the Hausa name TSUN TSAYE, meaning "birds."



Figure 3 Non-compliant mineral/vitamin complex

3.1.5. Socio-economic constraints:

These include:

Cost of care: the high cost of medicines and veterinary services limits access to care for many livestock farmers;

Insufficient awareness and training: the lack of awareness and training among livestock farmers regarding animal health is a major obstacle to improving herd health management, and this has a negative impact on self-medication practices.

4. Discussion

Among health management methods, vaccination remains a crucial practice for preventing various diseases. However, a study in Congo showed a low level of knowledge about zoonoses and low implementation of zoonotic prevention measures by communities [10]. The majority of farmers benefited from free vaccination against Peste des Petits Ruminants (PPR) and Contagious Bovine Pleuropneumonia (CBPP) because they recognize its usefulness. Vaccination of cattle, known as medical prophylaxis, against epizootic diseases is a key element of prophylaxis [10]. However, the reliance on traditional, often unsuccessful, disease prevention practices is concerning, and medications used to treat bovine diseases are becoming scarce in the DRC because they are imported and more expensive. Livestock farmers are increasingly turning to medicinal plants [11]. Disease control, in the context of prophylaxis, is achieved through medical prophylaxis or vaccination and animal health prophylaxis, which includes awareness campaigns, general hygiene measures, and quarantine [12]. Indeed, prophylactic measures (including vaccination) applied to cattle, sheep, goat, pig, poultry, and rabbit herds over the past few decades have led to improvements in livestock health, particularly with regard to notifiable contagious diseases (sometimes even resulting in drastic eradication measures) [13]. It should be noted that some farmers personally commit to vaccinating their animals against anthrax, anthrax, and pasteurellosis. Salmonellosis (excluding typhoid fever), for which domestic poultry can be vaccinated beforehand, is responsible for 3.4 million cases of foodborne illness worldwide each year, with all the associated health and economic consequences [14]. Hygiene in housing and livestock is practiced by all farmers, although milking hygiene is less common (5%). This still reduces infections and infestations. These results differ from those reported in Mandoul, Chad, where vaccination and deworming are carried out simultaneously, with respective rates of 10.84% and 10.19% [9]. However, it should be noted that, regarding housing hygiene, some authors have arrived at high values, suggesting that 15% of pork in beef could indeed originate from cross-contamination situations linked to strict cleaning rules between grinding operations [15]. The field survey revealed the presence of various diseases in the study area. It was observed that diseases of parasitic origin occurred at least once a year. These results are similar to those obtained in dairy cattle and sheep farms in France, where 9 out of 13 farmers surveyed confirmed having identified parasitic diseases [16]. But lower than that found in camel herds in the peri-urban area of Niamey, where 20 out of 32 herders, or 81% of those surveyed, reported the presence of diseases such as mange in their herds [17]. Veterinarians and self-medication are methods used to combat disease. In Mandoul, Chad, combining vaccination with deworming was the most frequently practiced health measure among the surveyed livestock farmers. More than 55% of agro-pastoralists and 37.44% of agro-pastoralists reported managing the health monitoring of their animals themselves [9]. However, other authors have shown that group housing leads to an increase in enteric and respiratory diseases [18]. Of the 68 veterinary medicines identified on the market in the Niamey district, more than a third (1/3) of these products are not registered. However, antiparasitics are the most prevalent, followed by antibiotics and CMV (compound-vegetative-missile) products. These results are different from those obtained by the RECA team in the livestock markets of commune 2 of Tahoua and Illéla, the markets of Badaguichiri, Guidan Idder (commune of Malbaza), Konni, Ayawane (commune of Tama), Bouza [9]. According to these sources, of the 135 veterinary products, only 17, or 13%, are authorized. This is likely due to the porous border between Tahoua and Nigeria compared to Niamey and Nigeria. However, some authors have noted that the veterinary medicines used vary considerably from one region to another due to the diversity of animal species [19]. Thus, the illicit veterinary market poses a risk not only to animal welfare and health but also to human health. Several studies of veterinary medicines in West Africa have recorded rates of non-compliant circulation, including 43% in Mali and 69% in Cameroon for oxytetracycline [20].

5. Conclusion

This study, which aimed to evaluate the health management of dairy cattle herds in the Niamey community, identified veterinary products, most of which are antiparasitics and antibiotics, and more than two-thirds of which are not registered. The main pathologies encountered in dairy cattle are parasitism, followed by infectious diseases. To combat these diseases, methods include recourse to veterinarians and both modern and traditional self-medication. Hygiene practices are primarily observed through cleaning and disinfection. A challenge has been identified in the health

management of dairy cattle farms in the urban community of Niamey. The results of this study provide useful data for stakeholders (policymakers, researchers, partners) to design strategic interventions aimed at sustainably improving the health of dairy cattle herds in the Niamey region.

Compliance with ethical standards

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Disclosure of conflict of interest

There are no conflicts of interest.

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